WARNING

- The following procedures present hazards which can result in injury or death. Only persons qualified to carry out electrical and mechanical servicing should undertake this work.
- Always disconnect the APU's power supply (battery cables) prior to performing service work.
- Always wear safety goggles when cleaning the generator.

S9.0 Generator Electrical System Specifications

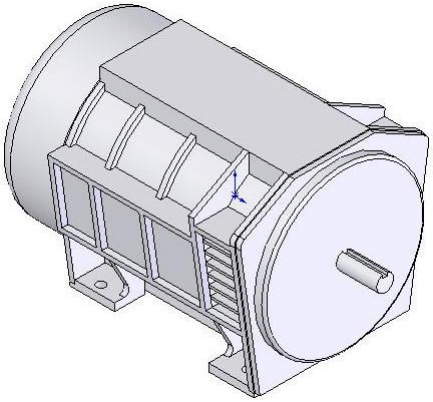

Figure 9-1

GENERATOR	SPECIFICATIONS
Generator	Markon: Model BL 105B
Output	6kW; 120 Volts [AC]; 60Hz

The RigMaster APU powers an independent 120 Volt alternating current generator. The output frequency is approximately 60 Hz (load factor dependent). Under zero load, the generator will produce approximately 125 to 130 volts. The generator must spin at the correct speed (~3600 rpm) in order for it to output within the acceptable range. The engine rpm is tuned such that the generator produces approximately 61.5 Hz under 1500 Watts of AC load. The engine rpm should be set using an digital volt meter with the capability to measure frequency across the hot and neutral wires.

NOTE

The engine rpm must NOT be set using an engine tachometer as the 120V generator will not produce the proper output voltage or frequency using this method.

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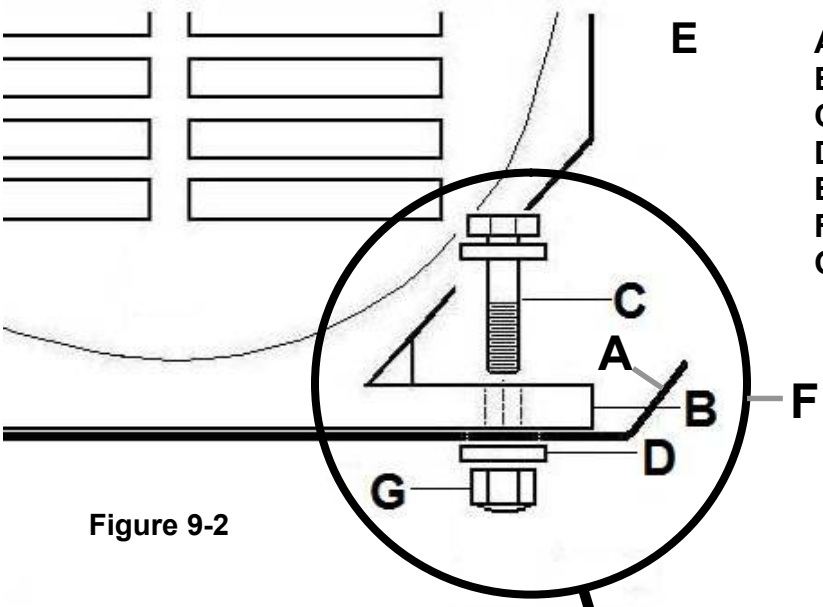
S9.1 Generator Mounting Diagrams

Serpentine Drive System



A - Rear Engine Mount Plate
B - Generator
C - Bolt
D – Flat Washer
E - Rear Side of RigMaster Unit
F – Bolt Assembly
G – Nylon Nut

Figure 9-2

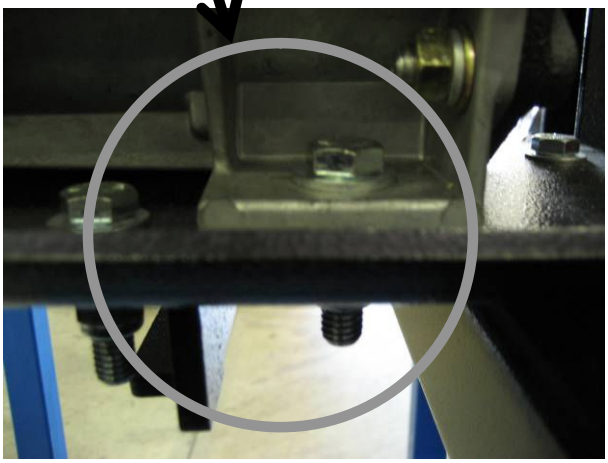


Figure 9-3

	Legend	QTY
A	Rear Engine Mount Plate	1
B	Generator Mounting Flange	N/A
C	Bolts 3/8 -16 X 1 ½ "	4
D	Hardened Flat Washers	8
E	Rear Side of RigMaster Unit	N/A
F	Bolt Assembly	N/A
G	Nylon Lock Nut 3/8” - 16	4

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V Belt Drive System

Towards Engine

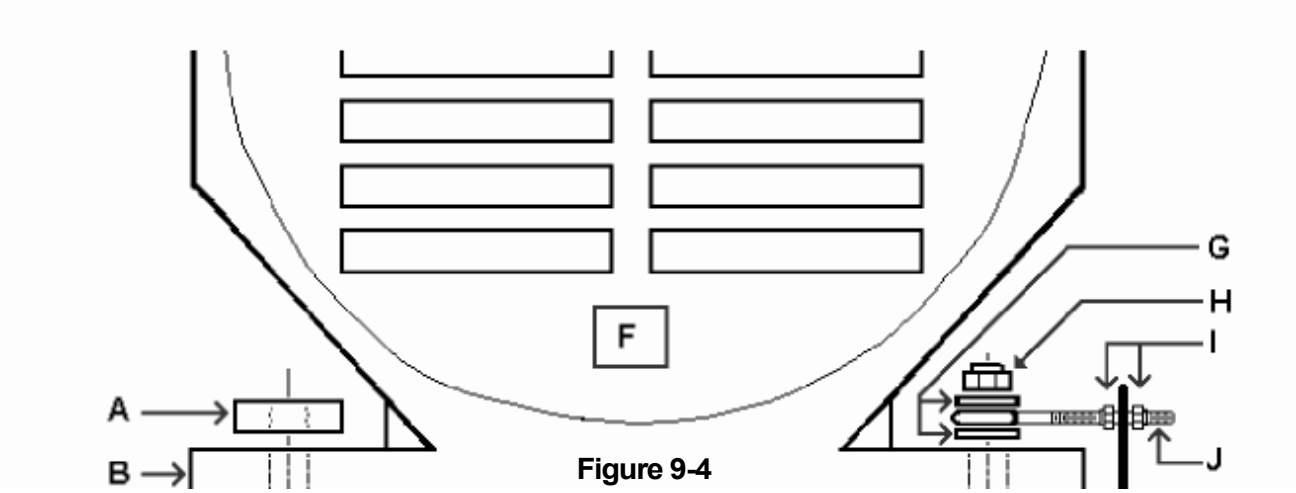

Figure 9-4

	Legend	QTY
A	Hold Down Block – 3/8 – 16 threaded hole	2
B	Generator Mounting Flange	N/A
C	Hold Down Bolts 3/8 – 16 x 1 ½	4
D	Hardened Flat Washers	4
E	Lock Washer 3/8”	2
F	6kW 120V Generator	1
G	Flat Washers 3/8”	4
H	Lock Nut 3/8” – 16	2
I	Adjuster Lock Nuts ¼” – 20	4
J	Generator Adjuster Eye Bolt	2
K	Generator Mounting Plate	1

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S9.2 Generator Removal and Installation

Removing the Generator (V Belt)

1. Remove the tape; re-tape the wire nuts when replacing the wire nuts.
2. Disconnect the 2 120V power cables from the generator (see generator electrical schematic).
3. Remove cables from connection box and secure
4. Loosen adjusting bolts
5. Loosening the two (2) 1/4" hex nuts evenly until the belt is slack, then remove both adjusting nuts

NOTE

To adjust the generator belt tension, loosen the generator tie down bolts that go through the four slots in the generator plate.

6. Slide forward towards and remove generator belt
7. Remove generator from the mounting plate

Upon reinstallation, thoroughly clean rear mounting feet and the corresponding mating surface. Apply a coat of high tack gasket maker to the two (2) rear mounting feet of the generator and co responding tie down blocks. Re-tape wire nuts to prevent the wire nuts from loosening.

In order for the generator to produce the 6kW at 60 Hz, the generator must rotate at 3600 RPM. The proper method for setting this speed is to use a multi-meter equipped with Hz or frequency capabilities. Measure the output at the receptacle by inserting the test leads into the line and neutral openings. With no load on the generator and at approximately 70°F ambient temperature, the Hz should be 61.5 Hz minimum. Ideally the generator should be tested und er partial load, such as with the block heater plugged in, and set the speed to 60.5 Hz.

NOTE

The use of a corrosion inhibitor is recommended on all electrical connections. Ensure all electrical connectors are tapped up securely to prevent loose connections under vibration.

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Removing the Generator (Serpentine Belt)

1. Remove the front aluminum cover.
2. Remove back generator cover using 7/16 socket wrench. (7 bolts)
3. Remove the bottom plate using 7/16 socket. (12 bolts)
4. Remove the serpentine belt following the procedures in S2.4.
5. Remove the junction box lid and remove the tape and wire nuts.
6. Disconnect safety cover switch quick disconnect and remove right-side panel using 7/16 socket wrench. (4 bolts)
7. Disconnect the 2 120V power cables from the junction box and remove the cables from the bulkhead.
8. Loosen and remove the 4 mounting bolts.
9. Remove generator from the engine mounting plate.
10. Remove the generator pulley with the woodruff key.

Installing the Generator

1. Place generator on engine mount plate.
2. Install 4 mounting bolts and hardware and torque to 80 lbs. ft.
3. Install the power cords routing them back through the bulkhead connectors to the junction box connectors.
4. Wire the generator box using the wire nut connectors and secure with electrical tape. (See S10.6 for electrical diagram)
5. Install the junction box lid and screw.
6. Re-install the right-side panel using 7/16 socket wrench (4 bolts) and re-connect the safety cover switch.
7. Install the generator pulley and perform the pulley alignment procedure. (See section S3.4)
8. Install the serpentine belt.(See S2.4)
9. Install the bottom plate using 7/16 socket. (12 bolts)
10. Re-install back generator cover using 7/16 socket wrench. (7 bolts)
11. Re-install the front cover.
12. Test generator. (See S9.3)

CAUTION

Dangerous AC voltages are present when the generator is running. Ensure care is taken not to ground wires when testing.

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S9.3 Testing the Generator

1. Using a digital multi meter test both block heater and bunk outlets. Position the test leads between hot and neutral prongs of the plug. Voltage should be no lower than 110 V AC.

2. Using a volt meter capable of measuring frequency in Hz. Position the test leads across the hot and neutral of the block heater circuit and measure the frequency.

    - The output should be 61.5 Hz with a 1500 watt load.

3. If the above measurements are incorrect see adjusting the Engine Idle in section S9.4.

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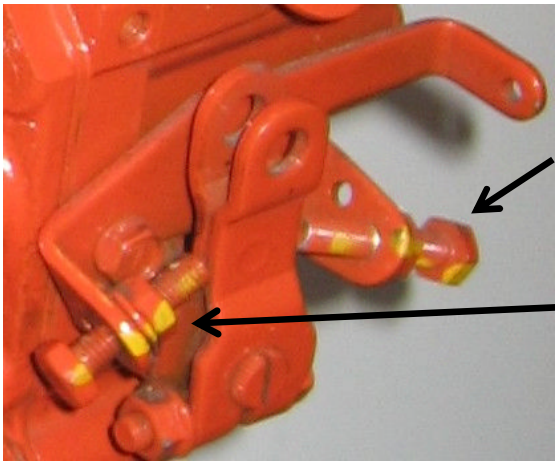
S9.4 Adjusting the Engine Idle

In order for the generator to produce the 6kW at 60 Hz, the generator must rotate at 3600 RPM. The proper method for setting this speed is to use a Hertz (Hz) meter to measure the alternating currents frequency. Measure the output at the receptacle by inserting the test leads into the hot and neutral openings. Ideally the generator should be tested under partial load (1500W) plugged into the block heater. Set the frequency with this load to 61.5 Hz by adjusting the engine idle. (See figure 9-5)

Throttle Control Assembly



Low Idle Throttle Screw
(ADJUST TO GENERATOR OUTPUT)

High Idle Throttle Limit Screw
(FACTORY SET: DO NOT ADJUST)

Figure 9-5

NOTE

The high idle throttle screw has a plastic cap that is installed at the factory after adjustment.

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S9.5 120 Volt Generator Diagnostics Procedures

Please read and understand this entire section prior to performing any work on the 120V generator. If the following tests fail to identify the cause of the generator failure (breaker, capacitor, field windings, outlet, wiring) the generator may need to be replaced.

1. If there is no power to the outlet, reset breakers on the generator. For the Ground Fault Interrupter receptacle, try to reset the breaker on the outlet before those on the generator.
2. See that the generator belt is in place and properly tensioned. (1/8" to 1/4" deflection).
3. If breaker reset does not restore power to the receptacle, remove generator cover and junction box lid and see that there are no loose or broken connections.
4. Pull back the rubber boot and test for 120V line power from the [red lead T1 to neutral white lead T2] and [brown lead T3 to neutral blue line T4] (engine must be running with the air conditioning system OFF).
5. If there is continuous power through each breaker, but no power to the outlets, the cable and outlets may be the cause of the failure.
6. If there is line power from the T1 and T3 to their respective breakers but no power on the load side, the breaker has either failed or requires that it is reset. The breakers do not require any power to be reset.
7. If there is limited voltage to the breakers from leads T1 and T3, ensure that the RPM of the engine has not come out of adjustment. The generator should produce a hertz frequency of 61.5Hz while under a 1500 watt load. If the generator produces less than this Hertz frequency, regardless of the voltage reading, the idle of the engine should be adjusted accordingly.
8. If the hertz frequency is correct remove the neutral line wire nut and measure the voltage across [red lead T1 and white lead T2] and between the [brown lead T3 and the blue lead T4] there should be a minimum voltage of 1.5 volts. If the reading is less than 1.5 Volts the capacitor may need to be flashed. (Please see S9.6 for more information on this procedure).

NOTE

Step 8 should be performed if the generator produces low voltage under minimal load conditions.

9. If the equipment has been stored or allowed to get damp or dirty the insulation resistance of the windings should be checked (see S9.6).

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S9.6 120 Volt Generator Service Procedures

DIAGNOSTIC TOOLS

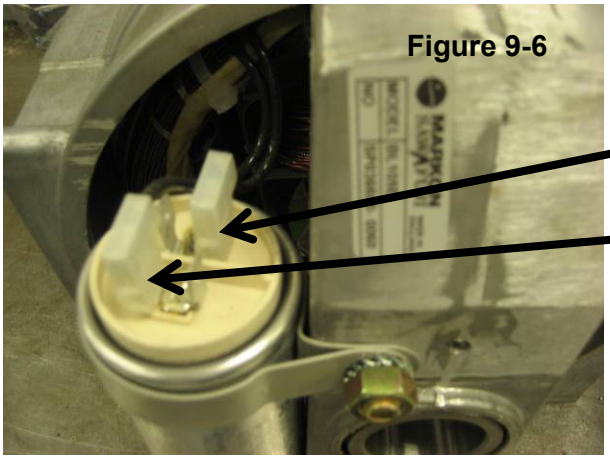
- Megger Tester 500V minimum capability [for testing field windings]
- Electrical Test Meter(s) capable of measuring Volts (V), AC Frequency Hertz (Hz) and Capacitance in micro Farads (µF) [for testing voltage, generator RPM and capacitance]

Capacitor Flashing

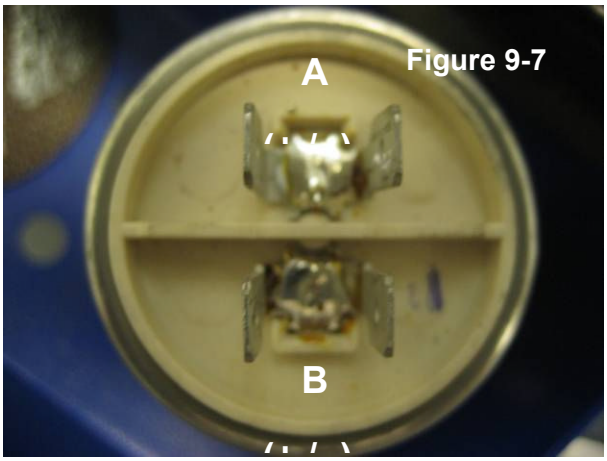
NOTE

The capacitor is non-polar until charged. To determine the polarity of a used capacitor test the Voltage between post A and post B (see figure. 9-6). If the voltage reading is a positive number the red test lead represents the positive terminal. If the voltage reading is a negative number the red lead represents the negative terminal. Figure 9-7 shows that the terminals may be positive or negative depending on how they were initially charged. When flashing the capacitor determine the polarity before applying battery voltage.

Capacitor Location



Capacitor Terminals



If the voltage is below 1.5 volts or there is no voltage, reconnect the capacitor leads to the original position. A 12 volt battery should then be instantaneously flashed (that is connected for only one second) across the capacitor. The auxiliary leads must still be connected to the capacitor. Run the generator and the output voltage should then build up to normal off load voltage of 130 volts AC @ 61.5 Hz.

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Note

For further information see Installation, Service and Maintenance manual supplied with 120V Generator.

Testing the Capacitor (40µfd) [RP7-023])

To check the capacitor first remove the end cover, disconnect the leads to the capacitor and with a suitable meter check the level of capacitance across the terminals on top of the capacitor from terminal A to terminal B (Figure 9-7).

This should read 40uF +/-5% i.e. (between 38uF and 42uF) if the capacitor is outside these limits it should be replaced.

Removal and Installation of the Capacitor

Before removing the capacitor please short it by crossing Terminal A to Terminal B to remove any residual voltage (see Figure 9-8).

Remove the capacitor and refit new one do not over tighten the bottom fixing nut. Reconnect the capacitor leads to the original position fit end cover and test generator.

Insulation and Resistance Check (See figure 9-8)

1. On BL models before carrying out this test disconnect the capacitor
2. The check should be carried out the stator windings between each winding group and the generator frame, and between the rotor windings and rotor core using a 500 volt tester or similar instrument.

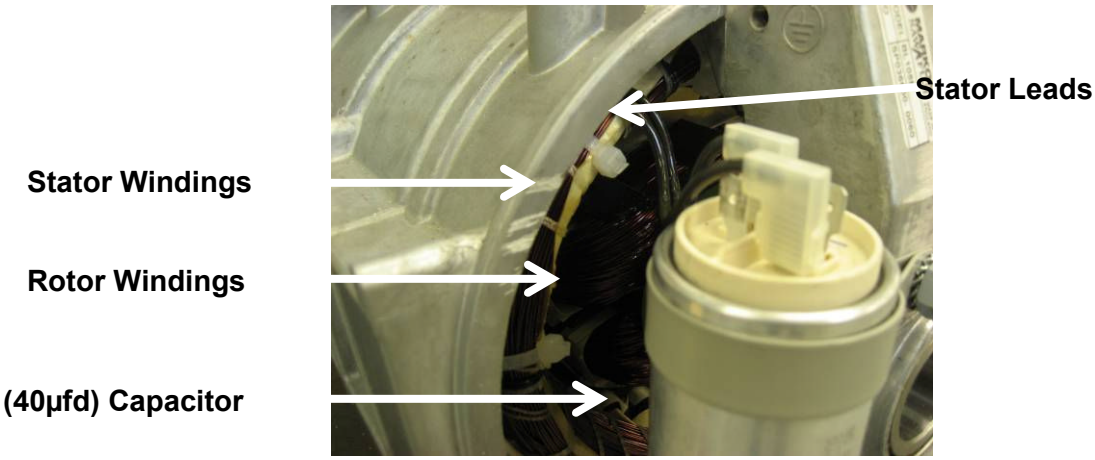

Figure 9-8

3. The resistance value obtained should be at least one megohm (one million Ohms Ω).
4. If the resistance is less than one megohm the windings should be cleaned of dirt by blowing with compressed air and dried out in a warm atmosphere. See section 2.12 for more information on this procedure
5. If moisture is present within the generator the resistance values may be rechecked periodically until this value is obtained.

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S9.7 Generator Wiring Electrical Schematics

Junction Box Wiring Schematic

CAUTION

Vibrations can cause wire nuts to become loose or fall off. When wiring the generator it is important to use electrical tape to fully secure the wire nuts.

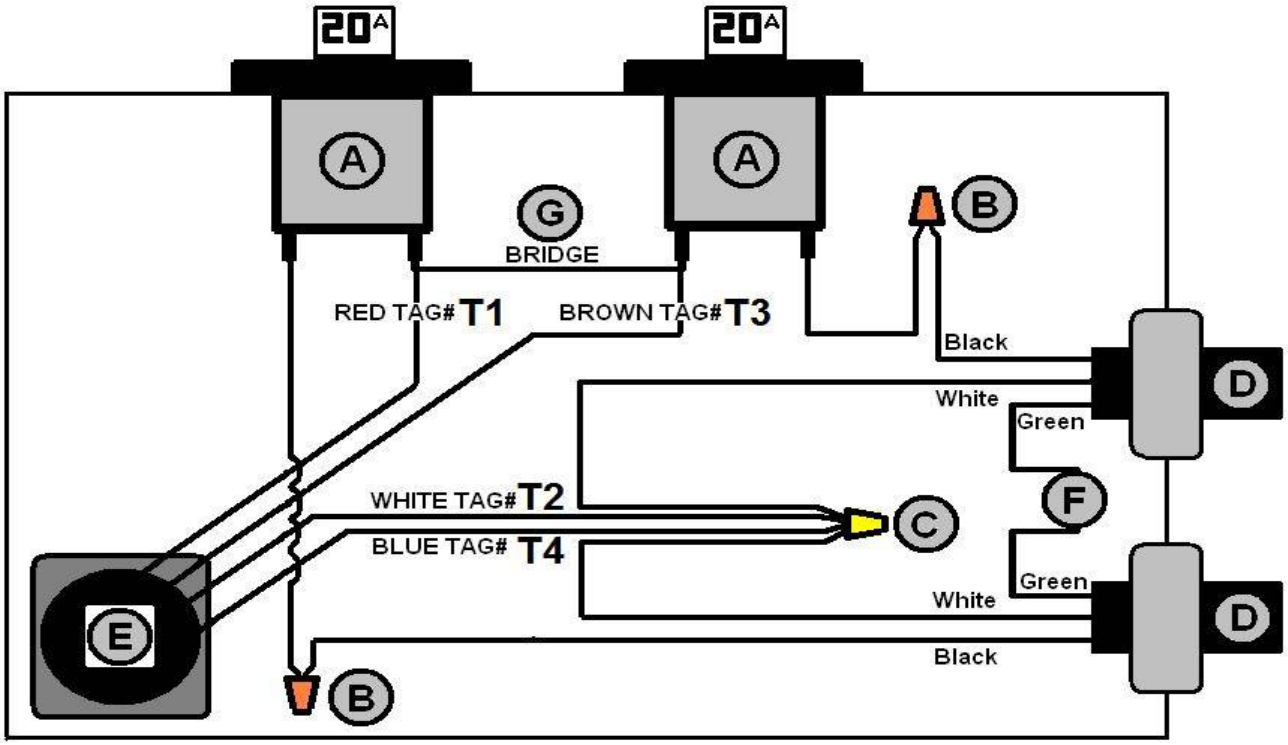

Figure 9-9

LEGEND	
A	20 Amp Breakers
B	Small Wire Nut – Twist On
C	Large Wire Nut – Twist On
D	120 Volt Electrical Cables
E	Wiring from Generator
F	Green Wires Grounded Using Existing Junction Box Mounting Bolt
G	Breaker Interconnect Wire (Bridge)

Cabin & Block Heater Electrical Cords:

- Two Green Wires to Ground (**F**)
- Two Black Wires, One to Each Breaker (**B**) - Black Wires from the Sleeper or Block Heater Cords can be connected to either breaker.
- Two White Wires to the White Tag# U2 and Blue Tag# U6 (**C**)

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S9.8 Installation of the 120 Volt Generator Pulley

Figure 9-10

Figure 9-11

To install the generator pulley you need to use an alignment tool. Serpentine drive pulleys require that they be aligned very accurately to prevent any damage to the belt or to the belt driven components. Install the pulley and push it on gently with a padded dead blow mallet. Bolt the alignment tool to the fly wheel and align the pulley with the tool following the procedure in Section S3.4. Tighten the grub screw (use Loc-tite to ensure the grub screw does not become loose over time).

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S9.9 120 Volt Cables and Outlets

Figure 9-12

In a typical installation there is a 120 Volt 20 Amp Ground Fault Circuit Interrupter (GFCI) type outlet in the sleeper. The cable is not shown.

Figure 9-13

The block heater extension cable is supplied with orange wire loom from the factory. It is required that all cables and hoses are loomed prior to installation to prevent rub through and subsequent product failures.

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